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**Topic:** Conducting Investigations within our Natural Community  **Grade Level:** 6

**Objectives:** Students will collect, display and interpret data from a local lake to draw conclusions about the health of its ecosystem.

**Time and Place:** 3-4 periods (2-3 for activity intro, data collection and testing at Willow Lake/1 for data interpretation)

**Standards:**

LS2.A: Interdependent Relationships in Ecosystems

MS-LS1-1: Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation.

**Danielson Components:** 3C Engaging Students in Learning

**Lesson Preparation/Materials:** Students will be arranged into 6 groups (4-5 students in each).

For water sampling at the lake, each group will bring 5 small plastic test tubes and a container/bag in which to carry the samples back to school.

In class there will be materials to test for pH, dissolved oxygen, nitrate, phosphate, chloride and coliform bacteria. Each group will be provided with the appropriate materials to complete their test (instructions and reading materials).

**Lesson Procedure:**

**1- Do Now:** Why do you think it is important to test the quality of our local waterways?

-Students will jot the question in their notebook and have time to discuss with their table partner before sharing out with the rest of the class.

**2- Teach:** I will ask students if they are familiar with Willow Lake and inform them that we will be doing a study of this area to test the health of its ecosystem. Just as people expect their water to be of a certain quality, so do animals and plants that live in ponds, rivers, lakes, etc. I will inform the students of their groups and hand out information on what each group will be testing. Since each group is testing a different factor that affects the health of a lake, we can collectively share our data at the end of the study to determine whether or not this pond is in overall good health.

**3-Explore:** Each group of students will be given resources (short, leveled texts) to explore what they are testing. The testing kits come with books, however, some students may benefit from simplified texts to explain what they are testing and why. I will come around to each group to demonstrate more carefully how they will use their water testing materials once they have obtained their samples.

-Before leaving, all students will make a simple chart in their science notebook to record their data once back in class. They will also label their water sample test tubes (1-5).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Testing for  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 | Average |
|  |  |  |  |  |  |

**4- Field Work:**

-Each student will bring their science notebook and pencil.

-Each group will elect a student to carry group supplies to and from the lake.

Once at the lake, students are reminded of appropriate field work behavior/stewardship. “This is a place we will continue to visit and explore throughout the year, it is part of our neighborhood and a place people enjoy visiting”.

Before collecting samples, students will be given time to take in their surroundings and discuss what they notice, anything surprising, etc. Lastly, each student will make a prediction about the overall health of the lake. Along with their prediction, they are encouraged to give a reason “What do you see that makes you think that?”

**5- Back at School:** Students will perform the individual water tests and record their data in their notebook.

Once students are done, they will be prompted to discuss the outcome of their test and develop a simple claim as a group, “Our data shows \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_”. This will be posted on an index card and placed on a chart paper before students are dismissed.

**Day 2- Analyzing Data and Drawing Conclusions**

**Lesson Procedure:**

**1- Do Now:** Copy down the claim that your group came up with yesterday. Add 2-3 sentences of evidence from your data to support your claim. (At this point in the year students have already been introduced and begun to practice writing a scientific explanation which we do in the form of a C.E.R. (claim, evidence, reasoning). Some students are given a worksheet with prompts (sentence starters) to help them succeed in this task. I will circulate to assess students’ ability to write a clear and concise claim with appropriate evidence.

**2- Teach/Model:** Now that students have collected their data, we will take some time to share the results with the class. On the smartboard I will post a table for each group to record their findings. They are reminded to record the average of their findings. In the last column they are asked to write a really brief description of what the test they performed is showing us.

-To model, I will plug in my data for the turbidity of the lake since that is the information I collected.

For example:

**Water Testing at Willow Lake, Flushing NY**

|  |  |  |  |
| --- | --- | --- | --- |
| **Test Performed** | **Normal Levels** | **Our Results** | **This shows us . . .**  **which means . . .** |
| **Turbidity** | 20-40 JTU | 40 JTU | that the turbidity is within normal levels which means the water is clear enough for aquatic life to live and function |
| **pH** |  |  |  |
| **Dissolved Oxygen** |  |  |  |
| **Nitrate** |  |  |  |
| **Phosphate** |  |  |  |
| **Chloride** |  |  |  |
| **Coliform Bacteria** |  |  |  |

**3- Group Work and Share:** Students will elect 1 recorder and 1 reporter. Once all data is inputted, the reporter will share their information with class. Students are encouraged to show some of their water samples to aid in their explanation of data.

**4- Independent Task (Assessment):** I will focus our attention back to the original problem we discussed:

Is Willow Lake a healthy ecosystem?

Students will be instructed to answer this question in the form of a C.E.R., this time including evidence that addresses at least 2-3 pieces of data and sufficient reasoning that justifies their claim.

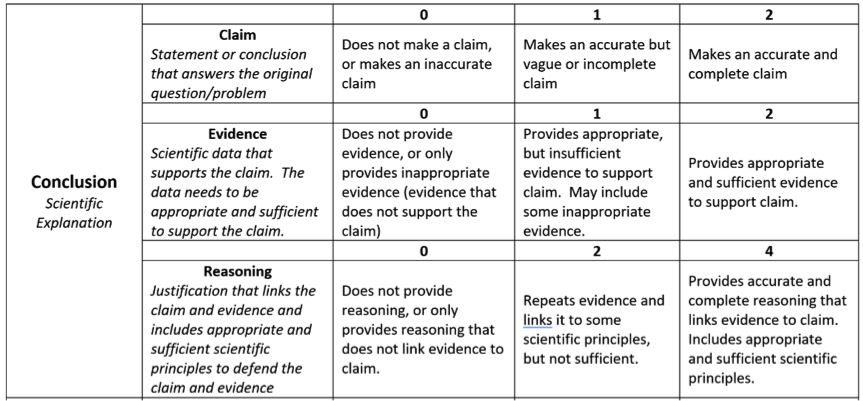
-Some students will again be given a pre-written worksheet with prompts.

**For Example:** --------------------------------------------------------------------------------------------------------------------------

Will Lake is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ ecosystem. When we tested \_\_\_\_\_\_\_\_\_\_\_, the results were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. These results are *normal/not normal* for a lake. When we tested \_\_\_\_\_\_\_\_\_\_\_\_, the results were \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. These results are *normal/not normal* for a lake. This evidence shows us \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. . .

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-Students have a C.E.R. chart up in the room to remind them of the expectations along with the rubric used to assess their scientific explanations.



This is a sample CER rubric from <https://www.chemedx.org/article/implementing-claim-evidence-reasoning-framework-chemistry-classroom>

**5- Next Steps:** We can revisit the pond and look more carefully to see the human impact surrounding this ecosystem. Through first hand observation and research we can make a better connection between what may be happening in the lake with what is happening around it (roadways, pollution, acid rain, etc.). Students can then identify steps needed in order to maintain the health of the plants and animals in this area by making posters/leaflets, etc.